In the United States Patent and Trademark Office


Serial Number: 10/032,535
Appn. Filed: 01/02/2002
Applicant(s): John Shaw et al.
Appn. Title: Method and System for Facilitating Secure Transactions
Examiner/GAU: OYEBISI, Ojo / 3696


**Declaration of John Doulamis**


I, John Doulamis, being over the age of eighteen and competent to testify, make the following declaration:


1. I hold a bachelor's degree in Information Technology from University of Athens, Greece and a Master of Science in Computer Science (M.Sc.) from The American University, Washington D.C. My educational background in information technology and computer science, and my experience working with trading systems, has given me knowledge and expertise in the field of securities trade automation - a field that almost exclusively involves computer-based automation and communication software and hardware. I know well the software and hardware used by trading systems to accomplish trade automation, and have a detailed and expert understanding of the requirements and constraints placed on these systems by traders, portfolio managers and other financial services providers.


2. From 1996 to 2008, I worked for Macgregor and Investment Technology Group (ITG), the well-known global trading technology company. Both companies specialize in order management systems for the securities industry. From 1996 to 2006 I held various positions in the Software Development department at Macgregor, essentially covering the entire range from Junior Developer to Vice President of Software Development. I have over 12 years experience in the securities trading business, and have substantial expertise in financial technology and the firms that use such technology.

3. From 2006 to 2008, I was a full-time consultant for the Research and Development group at ITG. During my tenure at Macgregor and ITG, I became intimately familiar with Order Management Systems - which constituted the companies' business nucleus - as well as most of the software systems that surround and accompany an OMS (portfolio management, research/analysis, live pricing, execution links, compliance etc). I acquired a well-rounded knowledge of the entire spectrum of such systems along with their interactions, by performing various tasks such as:
   a. Hands-on development of core OMS features
   b. Second-level technical support of customer issues (bug fixing)
   c. Application integration between OMS and other software systems at various levels (Data level, Functional level, Presentation level)
   d. Design of new features and Product Roadmap management

4. I am very familiar with the order management systems (OMS) available in May 1999, when the Shaw et al. patent was first applied for.

5. I have thoroughly analyzed the Shaw et al. patent application, as well as the SEC reference and LimiTrader system discussed therein.

6. I am absolutely certain that as a development team, we would have considered the integration of the LimiTrader system with an OMS impossible in May 1999, and certainly not obvious. An effort like that would have been deemed infeasible and meaningless, for many reasons including the following:

7. OMS users demand a single and responsive interface that supports the full trading process, including communications among internal parties such as portfolio managers, traders and compliance officers, and external parties such as brokers, execution systems, settlements systems, and market data providers. Providing such an interface to LimiTrader would not have been possible without a substantial redesign and rewrite of the LimiTrader system – making integration with an OMS not only impractical, but unthinkable.

8. To satisfy the demands of OMS users, OMS providers invest substantial resources to support and integrate all the trading functions and systems required to fully automate and speed up the life cycle of a trade. Integration of these real-time workflow systems is a very complex undertaking. For integration to be successful, it must be achieved at multiple levels: starting with the database and data models that provide a common platform for robust semantic interchange across systems, continuing at the messaging and service levels that allow systems to cooperate and synchronize their functionality and

complete a business transaction or sub-process, and ending with a single user interface to eliminate the need and risks of duplicate data entry, and the confusion associated with distinct interface standards. OMS providers have had to develop most of this functionality from scratch, in order to ensure that all elements at each of these levels are tightly and correctly integrated in real-time.

9. Systems designed in the early 1990s, such as LimiTrader, did not anticipate a future in which computer technology would allow for independently developed systems to share resources and cooperate in real-time. Closed system design was the prevailing model for trading system architecture throughout the early 1990s. Systems were envisioned to be stand-alone entities, and only interface with external systems through batch-oriented file based import/export utilities. LimiTrader is a shining example of such closed system design.

10. If someone had asked our company in 1999 to integrate an OMS with the LimiTrader system, we would have replied that such an integration was not feasible, much less obvious, because LimiTrader was a closed system and was not designed to be integrated with external systems. And this situation was not uncommon – often, customers would request that an OMS be integrated with a proprietary or 3<sup>rd</sup> party legacy trading system, and we would have to reply that integration was not possible because the trading system was designed as a closed system (as LimiTrader was).

11. The LimiTrader design, the norm at the time, was simply not designed to be integrated with an OMS. It lacks all the critical elements required for it to be integrated with an OMS, or any other real-time trading workflow system. It does not have an 'open' architecture, for example one built around a SQL Relational database that would allow other systems to access and modify business data in a transactionally robust manner. It also does not have a "real-time" system architecture, which can support event-driven message based integration across systems. It does not have the ability to publish events or provide a transactionally-safe, service-oriented application program interface (API), both of which are important technical requirements for a trading system which will be integrated with an OMS. Further, the LimiTrader system does not include support for critical business functions such as block trading, 24 hour trading or international trading. Without this support, integrating LimiTrader with an OMS would have been impossible, because an OMS does provide these critical business functions.

12. Moreover, the dial-up system used by LimiTrader to communicate with parties would be inadequate to support the equity trading decisions and workflows from the OMS. And the lack of a real-time API would require a user to go to the LimiTrader terminal just to cancel an order, adding unacceptable delays.

13. Further, LimiTrader's non-secure matching approach is not suited for the OMS market. One of the main benefits of an OMS is that it allows users to retain control of their orders until the last possible moment. Equity traders, the majority of OMS users, are extremely wary of letting any outside parties learn the contents of their order book. They know that any information about their intention to buy or sell shares in the near future can be exploited by 3$^{rd}$ parties to take advantage of them. They use the OMS as a platform for quickly directing and redirecting their orders across any and all liquidity sources. It is unthinkable that OMS traders would direct any order flow into a matching system such as LimiTrader that notifies multiple parties of possible matches. OMS traders would require that they be immediately and simultaneously notified of any match, and that only one match be proposed at a time. LimiTrader was not designed to support this requirement. Actually, LimiTrader seems to have been designed for a market where information leakage is not a great concern, and where participants expect and accept that market information will propagate in several minutes rather than in a couple of seconds.

14. There are also a number of other LimiTrader features that clearly point to a system not compatible with OMS integration. For instance, an initial capacity for 50 simultaneous users is at least a couple of orders of magnitude lower than what is required to support actual usage with an integrated OMS. Similarly, LimiTrader's 30-minute backup recovery capability would be unacceptable to the OMS market. Most organizations would demand a hot backup to guarantee uninterrupted access. It would be unthinkable for an equity trader to have orders in the LimitTrader system in an uncertain state for up to 30 minutes, because the trader would always be wondering: Did I miss a match? Was the order executed? What is my current cash position? It is critical to have such information immediately available at all times – and with LimiTrader, it would not be.

15. In addition, the OMS's in existence as of May 1999 were simply not configured for the features described in the SEC reference – i.e., non-automated bid or offer advice and market information – nor were they capable of handling such features without prior modification to the OMS. Examples of these OMS's, which existed in May 1999 and which were not configured to offer non-automated bid or offer advice and market information, include the Landmark system from The LongView Group, the Predator system from Macgregor, and the Charles River IMS system from Charles River Development.

16. Thus, users could not have obtained these features via an OMS in existence in May 1999 and integrated with a central matching system. The features would have been cut off unless the OMS had itself been modified before integrating it with the central system – and this would not have been obvious, because these OMS's are separately-owned and not freely modifiable. In other words, to retain LimiTrader's individualized features, one would have had to first modify the OMS, then also modify the LimiTrader system by grafting the OMS onto it. This kind of double, sequential modification would simply not have been obvious at the time of the Shaw et al. patent application.

17. Moreover, trying to make an OMS function via LimiTrader's existing dial-up system, over standard phone lines, would not be satisfactory. Standard phone lines simply do not have the capacity to handle the communication volume associated with a commercial trading environment, nor would such a configuration have the necessary communication speed. For these reasons, trying to use LimiTrader's existing dial-up system to handle order inputs from an OMS would render the LimiTrader system sub-optimal and slow.

18. Further, a configuration in which orders were received from individuals into the central system via an OMS, with a dial-up system "on the side" wherein the individuals placing orders via the OMS would dial into the central system to receive non-automated assistance would not be workable or economically viable, because a configuration like that would entail unnecessary duplication of the contact interface between order placers and the central system (i.e., place orders using one interface, but do everything else using another, completely separate interface). Such duplicate interfaces would require constant communication and reconciliation to ensure that information received from, and provided to, an order-placer via one contact interface matched information received from, and provided to, an order-placer via the other contact interface. Multiple interfaces are more expensive to operate and carry the risk of mismatched, inconsistent data.

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John Doulamis

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Date